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McNevin, C., McDowell, R., & Wakai, A. (2018). *Predictive performance of qSOFA and SIRS for length of hospital stay in ED patients with infection*. Poster session presented at The European Emergency Medicine Congress, Glasgow, United Kingdom. <https://eusem.org/courses-and-events/event/3-the-european-emergency-medicine-congress-2018>

Document Version:

Publisher's PDF, also known as Version of record

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Predictive performance of qSOFA and SIRS for length of hospital stay in ED patients with infection

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BACKGROUND:

The systemic inflammatory response syndrome (SIRS) criteria have been used by clinicians to screen patients with infection for the development of sepsis. However, the sensitivity and specificity of the SIRS criteria have been shown to be limited. It is in this context that the recent Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) Task Force recommended the quick sequential organ failure assessment (qSOFA) score for the prediction of mortality in sepsis. The primary objective of this proof-of-concept (POC) study was to compare the prognostic value of two sepsis screening tools (the quick sequential (sepsis-related) organ failure assessment [qSOFA] score and the systemic inflammatory response [SIRS] criteria) in predicting hospital length of stay (HLOS) for emergency department (ED) patients with an infection.

METHODS:

A retrospective observational study was conducted in an ED during two one-month periods among patients admitted to hospital with an infection. The associations between the qSOFA score and HLOS and between the SIRS criteria and HLOS were estimated using truncated regression models. The ability of the qSOFA compared to SIRS criteria to predict hospital LOS ≥ 3 days, in-hospital mortality, intensive care unit (ICU) admission and ICU stay of at least three days was estimated using the area under the receiver operating characteristic (AUROC) curve. For HLOS outcomes adjustments were made for age, gender and season.

The incremental value of both the qSOFA score and the SIRS criteria, above and beyond age, gender and season, in identifying patients with HLOS ≥ 3 days was estimated. Sensitivity analyses were used to compare results when the 3-day threshold for HLOS was changed.

RESULTS:

Overall, 330 ED patients with a suspected infection were admitted to hospital. Median HLOS was 7 days (interquartile range [IQR], 4-12 days). For each additional qSOFA point and each additional SIRS criterion, the expected hospital HLOS increased by 8% (incidence rate ratio [IRR] = 1.08, 95% confidence interval [CI] 0.92 to 1.27; $p=0.36$) and 27% (IRR = 1.17, 95% CI 1.02 to 1.33; $p=0.02$), respectively, controlling for age, gender and season. Both the qSOFA score (AUC = 0.54, 95% CI 0.43 to 0.68) and SIRS criteria (AUC = 0.57, 95% CI 0.45 to 0.68) demonstrated poor predictive validity for HLOS ≥ 3 days. Neither the qSOFA score nor the SIRS criteria improved the ability of age, gender and season to discriminate between patients whose HLOS was ≥ 3 days and those whose HLOS was <3 days ($p=0.81$). Both criterion exhibited poor discrimination for in-hospital mortality, ICU admission and ICU stay of at least three days. There was borderline evidence of an association between qSOFA score and risk of in-hospital mortality (HR 2.31, 95%CI 0.95 to 5.67, $p=0.07$).

CONCLUSION:

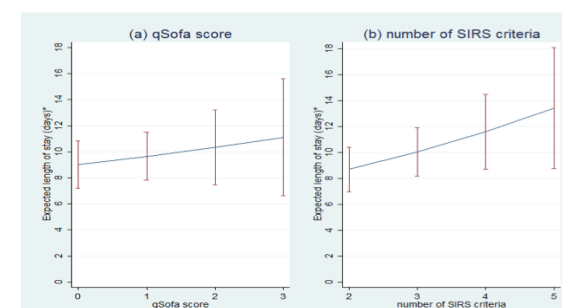
Although there is no significant difference between the qSOFA score and the SIRS criteria in predicting HLOS ≥ 3 days, with additional SIRS criteria there is a significant increase in HLOS in ED patients with infection that is not observed with additional qSOFA scores. The SIRS criteria may therefore be a more sensitive tool in predicting HLOS in ED patients with infection than the qSOFA score.

Table 1: Primary outcome measure : Length of Stay. Results from truncated regression analyses

Covariates	qSOFA score		Number of SIRS criteria	
	Unadjusted OR (95%CI, p-value)	Adjusted OR (95%CI, p-value)	Unadjusted OR (95%CI, p-value)	Adjusted OR (95%CI, p-value)
Age* (years)	1.02 (1.02,1.03), $p<0.001$	1.02 (1.02,1.03), $p<0.001$	1.02 (1.02,1.03), $p<0.001$	1.02 (1.02,1.03), $p<0.001$
Gender (Female v Male where Male = 1)	1.31 (1.04,1.64), $p=0.02$	1.34 (1.09,1.64), $p=0.01$	1.31 (1.04,1.64), $p=0.02$	1.34 (1.09,1.64), $p=0.01$
Season (Winter v summer where Winter =1)	0.84 (0.67,1.05), $p=0.13$	0.87 (0.71,1.07), $p=0.18$	0.84 (0.67,1.05), $p=0.13$	0.87 (0.71,1.06), $p=0.16$
qSofa score	1.14 (0.65,1.36), $p=0.15$	1.08 (0.92,1.27), $p=0.36$	-	-
Number of SIRS criteria	-	-	1.27 (1.10,1.47), $p=0.001$	1.17 (1.02,1.33), $p=0.02$

OR: Odds ratio; CI: confidence interval

Fig 1: Expected length of stay in hospital



*conditional on patients being admitted to hospital; models adjusted for age, gender and season i.e. male patients of median age admitted in the summer month

ACKNOWLEDGEMENT : The data presented here are as a result of a valuable collaborative process between the ED nursing, IT and medical staff in Beaumont Hospital. We thank them for their help and contribution. We also thank Dr Aoife Ni Shearcaigh for her help collecting data for this project.